

Status of Claims

Claims 1-6 and 17-25 are pending.
Claims 1-6 and 17-25 stand rejected.
Claims 1 and 17 have been amended.
Claims 7-16 are cancelled.

Remarks/Arguments

Upon entry of the accompanying amendments, claims 1-6 and 17-25 will be pending in this application. Claims 1 and 17 are amended herein to more particularly point out and distinctly claim the subject matter that Applicants regard as the invention.

Claim Rejections – 35 U.S.C. §103(a)

Claims 1-6, 17-23 and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ishii et al. (U.S. Patent 6,288,698) in view of Beck et al. ("Motion Dithering for Increasing Perceived Image Quality for Low-Resolution Displays" 13 July 1998, pages 407-410). Claim 24 is rejected under 35 U.S.C. §103(a) as being unpatentable over the above-combination, further in view of Wu et al. (U.S. Patent 6,469,708). Applicants respectfully traverse this rejection for at least the following reasons.

Independent claim 1, as amended, recites in part:

A method for processing video data...having a plurality of luminous elements to suppress a dithering pattern from appearing to a viewer observing a moving object on a picture...

...computing at least one motion vector representing the movement of a moving object on a picture from said video data in a motion estimator device of the video data processing device;

changing at least one of the phase, amplitude, spatial resolution and temporal resolution of said dithering function in accordance with said at least one motion vector representing the movement of a moving object on a picture when applying the dithering function to said video data in the dithering device of the video data processing device to suppress a dithering pattern from appearing to a viewer observing the moving object on the picture; and

outputting the dithered video data...to suppress a dithering pattern from appearing to a viewer observing the moving object on the picture on the display device.

(underling emphasis added). Claim 1 is directed to a method of eliminating a dithering pattern appearing to a viewer while observing a moving object on a picture. This suppression is achieved by altering a dithering function based on a motion vector representative of the movement of an object on a picture. Both Ishii and Beck, alone or in combination, fail to disclose or suggest this arrangement.

The Examiner cites the gray-scale and brightness control method of Ishii et al. (Ishii) as disclosing each of the elements of claim 1, with the exception of “a motion vector representing movement of a moving object” used to change “at least one of the phase, amplitude, spatial resolution, and temporal resolution of said dithering function...” The Action cites Beck et al. (Beck) as disclosing such a feature. Applicants respectfully disagree.

Ishii “relates to computer graphics, particularly to electronics for controlling flat-panel display gray-scale and brightness.” (col. 1, ll. 6-8), and makes no teaching or suggestion of a method to suppress a dithering pattern resulting from a moving object observed by a viewer as required by claim 1.

The Action cites col.1, ll. 35-53, col. 2, ll. 35-38 and 46-55, and col. 3 ll. 35-50 as teaching the method step of “outputting the dithered data to the display...to suppress a dithering pattern from appearing to a viewer observing the moving object on the display device” as required by claim 1. Specifically, the Action states that

Ishii discloses "outputting the dithered data to a display...so that artifacts are eliminated including video dither and checker-like patterns." Action, page 4. However, the cited paragraphs teach only "[r]andomized and evenly distributed phase number control functionality eliminates screen beating artifacts, for example, when image includes dither and checker-like patterns." Contrary to the Examiner's assertion, this does not mean that a checker-like pattern (or dithering) is avoided, as it is disclosed that only "screen beating" (a kind of flickering) is avoided. Screen beating can occur when applying a dithering on an input picture already including a dithering (or checker-like) pattern (for example coming from a graphic card). Moreover, no teaching or suggestion is made in Ishii of eliminating an observed dithering pattern resulting from a moving object on the display. In fact, no reference is made to displaying any object in motion, let alone a method to reduce visible dithering patterns produced by said object in motion.

Accordingly, Ishii does not disclose or suggest "...outputting the dithered data to the display...to suppress a dithering pattern from appearing to a viewer observing the moving object on the display device".

As noted above, the Action cites Beck as disclosing "computing at least one motion vector representing the movement of a moving object on a picture" as required by claim 1. Applicants respectfully disagree with this assertion.

Beck, like Ishii, is not directed to correcting visible dithering patterns created by a moving object on the display, nor does Beck make any mention of dithering patterns created by moving objects, or moving objects of any kind. While Beck teaches the use of a "motion dithering" technique that includes using a "motion vector", this vector does not represent the movement of a moving object on screen. Rather, the vector of Beck corresponds to a predetermined artificial movement of a

static object on the display. Specifically, this vector is used to locate pixels at varying locations with respect to an original, still image. Col. 5, last paragraph of Beck. This technique increases the perceived image quality without increasing the display device's pixel resolution. Col. 3, last paragraph. Due to the limited number of pixels of a display device, motion dithering according to Beck takes into account an offset between an original image and the pixels on the final output device, as pixels can only be placed at integer locations. Therefore, varying intensity levels are used taking into account said offset over a series of frames. These frames are displayed repeatedly in rapid succession so that the human eye will average the frames together (Col. 7, paragraphs 2 and 3), and view a stationary object, rather than a moving object as claimed. See Fig. 7 of Beck and supplemental Fig. 5 attached hereto.

In contrast, Applicants' invention addresses the dithering pattern that becomes visible when an object in motion moves across the display. Specifically, it has been found that an equal dithering pattern may become visible for a viewer in the case of a moving object, as illustrated by a moving gray box (attached supplemental Fig. 6). Accordingly, Beck and the arrangement of claim 1 solve distinct, unrelated problems.

Finally, the combination of the motion vector according to the present invention with the gray scale controlling of Ishii does not lead to the present invention. For example, if the pixel position (the phase number) in Ishii is replaced by a motion vector and we take into account the table in Fig. 7A, which according to Ishii represents a 16x16 block matrix, for a homogenous area moving at constant speed (i.e. a group of pixels having the same video level and the same motion vector), because the motion vector is the same for all pixels, the result would be the

same phase for all the pixels (i.e. the same dithering value for all pixels). Consequently, the same output value is generated for all pixels, and the dithering effect not achieved.

As neither Beck nor Ishii discloses or suggests "computing at least one motion vector representing the movement of a moving object" in the picture, and neither alone or in combination discloses, suggests or is able "to suppress a dithering pattern from appearing to a viewer observing a moving object on the picture", Applicants respectfully request the withdrawal of the 35 U.S.C. §103(a) rejection of claim 1. Claims 2-6 depend directly from claim 1 and should be similarly patentable at least to the extent they depend from an allowable base claim.

Claim 17 has been amended in a similar fashion to claim 1 and contains similar subject matter. Accordingly, claim 17 should be patentable for at least the reasons described above. Likewise, claims 18-25 should be patentable at least to the extent they depend from allowable claim 17.

Accordingly, withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-6, 17-23-25 is respectfully requested.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Conclusion

Having fully addressed the Examiner's rejections it is believed that, in view of the preceding amendments and remarks/arguments, this application stands in condition for allowance. Accordingly, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicants' attorney at (215) 542-5824, so that a mutually convenient date and time for a telephonic interview may be scheduled.

Respectfully submitted,

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Date: February 25, 2010

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February 24, 2010

Encl.: Fig.5 and Fig.6 (one sheet)